

We claim:

1. A mapping catheter for use in mapping cardiac electrical potentials comprising:

5 a set of electrodes;

first positioning means coupled to said set of electrodes for spacing a portion of said set of electrodes, defined as a first subset of electrodes, apart from and not in contact with a surface of said heart;

10 second positioning means coupled to said set of electrodes for placing a second predetermined subset of said set of electrodes into contact with a surface of said heart.

2. The apparatus of claim 1 further comprising:

15 third positioning means coupled to said set of electrodes for placing a third predetermined subset of said electrodes into a position beneath a surface of said heart.

3. The apparatus of claim 1 wherein said set of electrodes
20 exceeds twelve electrodes.

4. The apparatus of claim 1 wherein said first subset of electrodes exceeds one.

25 5. The apparatus of claim 1 wherein said second subset is one or more.

6. The apparatus of claim 1 wherein said first positioning means is substantially spherical in shape.

5 7. The apparatus of claim 1 wherein said second positioning means is a substantially linear shape.

8. A catheter assembly 10 for mapping the interior of a heart comprising:

10 a first set of electrode sites defining a first electrode array 16;

said electrode array positioned within said heart with a substantial number of said electrodes not in contact with said heart;

15 a second set of electrode sites located in contact with said heart.

9. A catheter assembly 10 for mapping the interior of a heart comprising:

20 a flexible lead body 12, connected to a deformable lead body 14, said flexible lead body and said deformable lead body having a lumen 22;

said deformable lead body 14 deformable to a first collapsed position wherein said deformable lead body has a substantially
25 cylindrical shape and, said deformable lead body 14 deformable to a second expanded position wherein said deformable lead body has

a substantially spherical shape;

an electrode array 16 having a plurality of electrode sites located proximate said deformable lead body 14, wherein said electrode sites form a spherical array of electrode sites when said deformable lead body is in said second expanded position;

a reference catheter 18 having a tip electrode assembly 29;

said reference catheter being located in said lumen and supported for relative motion with respect to said electrode array such that said tip electrode assembly 29 may be placed into contact with said heart wall when said array is in said heart chamber.

10. The catheter assembly of claim 1 further comprising:

means for excluding blood from the interior of said deformable lead body when said deformable lead body is in said second expanded position.

11. The catheter assembly of claim 8 wherein said flexible lead body comprises a braid of insulated wires incorporated into a polymeric sheath.

12. A method of forming a catheter comprising the steps of:

a) forming a collection of insulated wires each having an interior conductor, and each having an exterior insulation coating;

b) braiding the wires formed in step a) forming braided structure

having a central lumen;

c) incorporating the braided structure in a polymeric material forming a flexible lead body;

5 d) removing said polymeric material from a portion of said flexible lead body exposing said braid of insulated wires forming a deformable lead body;

f) removing insulation from selected locations on selected insulated wires to form electrode sites on said deformable lead body.